

1. Brucella (brucellosis)

Micro 7 summary

G(-) rods/coccobacilli, un-encapsulated, non-motile, non-spore former.

obligate intracellular, catalase and oxidase positive, does not ferment carbohydrates.

a zoonotic disease targeting the reticuloendothelial system.

transmission: ingestion, mucosal/percutaneous exposure, and inhalation

types: 1. brucella melitensis → goats

2. brucella suis → swine

3. brucella abortus → cattle

4. brucella canis → dogs

pathogenesis:

no exotoxin , endotoxin is less toxic than other G-ve's

from portal of entry → passes epithelial and innate barriers → multiply in monocyctic cells (liver, spleen, bone marrow) → granulomas → necrosis and fibrosis

systemic circulation → bacteremic episodes

clinically: incubation period of 1-4 weeks, febrile illness; undulant fever, chills, sweats, musculoskeletal symptoms

young children: fever and monoarthritis of hip or knee

adults: long-lasting fever, low-back pain or hip pain

Dx: definitive → isolation of brucella from blood or biopsies

blood cultures → brucella agar, microaerophilic environment (8-10% CO₂), prolonged incubation and very hazardous

serology:

1. non-agglutinating → ELISA

2. agglutination, positive if :

a. fourfold increase titer

b. antibodies >1:80 or 1:160

IgM → IgG // IgA

maybe false negative due to blocking antibodies

Rx and prevention: doxycycline + rifampin for 6-8 weeks

national commitment to testing and slaughter of infected herds, pasteurize milk

no vaccine for humans

2. *Leptospira* (leptospirosis):

- 2 species: *L. interrogans*, saprophytic *biflexa*
- Thin, coiled motile spirochetes, spirally shaped (question mark appearance)
- G(-), 2 periplasmic flagella, seen by dark-field microscopy with Giemsa stain

Transmission:

Zoonotic, from contaminated rodents urine

Skin exposure (commonest), mucosal, ingestion

Pathogenesis: spectrum (mild – severe)

Incubation period of 1-2 weeks

Two phases:

1. Leptospiremic phase: Travels hematogenously –bacteremia
2. Immune phase: reside in (kidneys, liver) → hemorrhage and necrosis → dysfunction

Clinically:

most of the time it's mild with febrile illness (flu-like illness, fever, chills), Conjunctival suffusion may be present

Weil's syndrome (severe): triad of hemorrhage, jaundice, and acute kidney injury

- Dx:** 1. dark-field microscopy by Giemsa stain from blood, CSF, urine, tissues
2. Culture: EMJH selective medium, for 8 weeks

Then, Confirmed serologically by microscopic agglutination test (MAT)

Rx and prevention:

Mild and moderate: tetracycline

Severe: IV penicillin

Avoidance of exposure to urine and tissues from infected animals.

No vaccine for humans, only for agricultural and companion animals.

3. Mycobacterium (family: mycobacterium tuberculosis complex)

- Two major species: M.leprae, M.Tuberculosis
- Slow-growing, obligate aerobe, facultative intracellular, non-spore forming, non-motile
- Seen by acid fast stain (ZN stain)

Pathogenesis:

1. Latent TB: no symptoms, not-infectious, dormant bacteria (if immunity drops it might reactivate)
2. Active TB:
 - a. pulmonary TB (80-90% of cases)
 - b. extra-pulmonary 10-20% (pleural TB, skeletal TB, Gastrointestinal TB,...)

Gastrointestinal TB is uncommon (5% of extra-pulmonary TB)

- 3 pathways of entering the GIT:**
1. ingestion of contaminated milk or sputum (M.Bovis)
 2. hematogenous and lymphatic spread from tubercular focus
 3. direct spread to the peritoneum from adjacent foci (e.g. fallopian tubes)

Pathologic hallmark: granulomas in lymphoid tissue, with caseous necrosis and ulceration

Clinically: abdominal TB presents with fever, weight loss, anorexia, night sweats, abdominal pain and a palpable mass is common

- Dx:** 1. microscopy with ZN stain or Auramine immunofluorescence staining
2. culture on Lowenstein-Jensen or Middlebrook 7H10 agar

Screening tests: a. Tuberculin skin test

- b. interferon-gamma release assay (IGRA)

Rx and prevention:

1. Active TB:

- a. intensive initial phase of 2 months: isoniazid, rifampin, pyrazinamide, and ethambutol or streptomycin.
- b. continuation phase of 4-6 months: isoniazid and rifampin

2. Latent TB: isoniazid for 9 months

A live-attenuated vaccine (BCG vaccine) is effective for children against meningitis and disseminated TB, but has 0-80% efficacy against pulmonary TB.